YAKEEN NEET 2.0

2026

Vectors

Physics

Assignment Solution 02

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Question-01

Check which of the following is a unit vector:

1. $\vec{A} = \frac{1}{\sqrt{3}}\hat{i} + \frac{1}{\sqrt{3}}\hat{j}$ ✗

$|\vec{A}| = \sqrt{\left(\frac{1}{\sqrt{3}}\right)^2 + \left(\frac{1}{\sqrt{3}}\right)^2} = \sqrt{\frac{1}{3} + \frac{1}{3}} = \sqrt{\frac{2}{3}}$

2. $\vec{B} = \sin\theta\hat{i} - \cos\theta\hat{j}$ ✓

$|\vec{B}| = \sqrt{\sin\theta + (-\cos\theta)^2}$

$= \sqrt{1} = 1$

3. $\vec{C} = \frac{\hat{i}}{\sqrt{3}} - \frac{\hat{j}}{\sqrt{3}} + \frac{\hat{k}}{\sqrt{3}}$ ✓

$|\vec{C}| = 1$

4. $\vec{D} = 0.8\hat{i} - 0.6\hat{j}$ ✓

$|D| = \sqrt{0.64 + 0.36} = \sqrt{1}$

5. $\vec{E} = \frac{3}{5}\hat{i} + \frac{4}{5}\hat{j}$ ✓

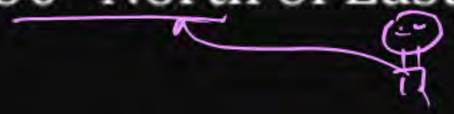
$|\vec{E}| = \sqrt{\left(\frac{3}{5}\right)^2 + \left(\frac{4}{5}\right)^2}$

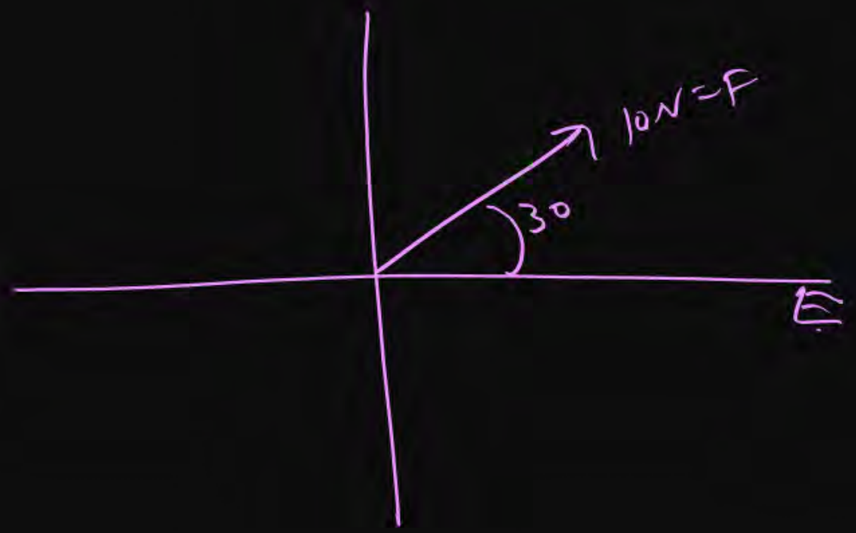
$= \sqrt{\frac{9}{25} + \frac{16}{25}} = \sqrt{\frac{25}{25}}$

$\vec{F} = \frac{1}{3}\hat{i} + \frac{1}{3}\hat{j} + \frac{1}{3}\hat{k}$ ✗

Question-02

Draw given vector in graphical representation:
Force 10 N 30° North of East

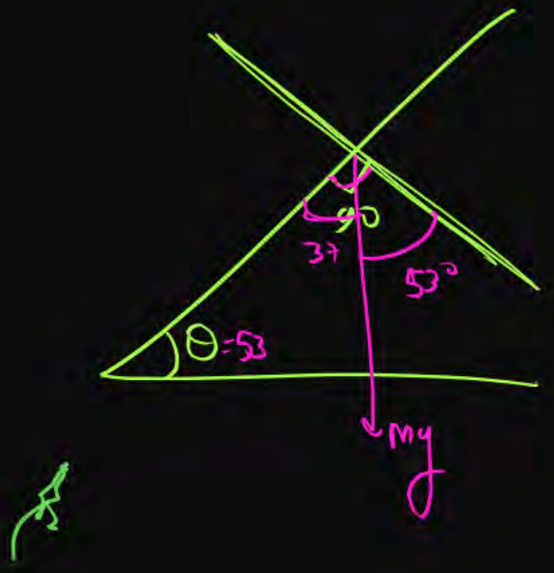


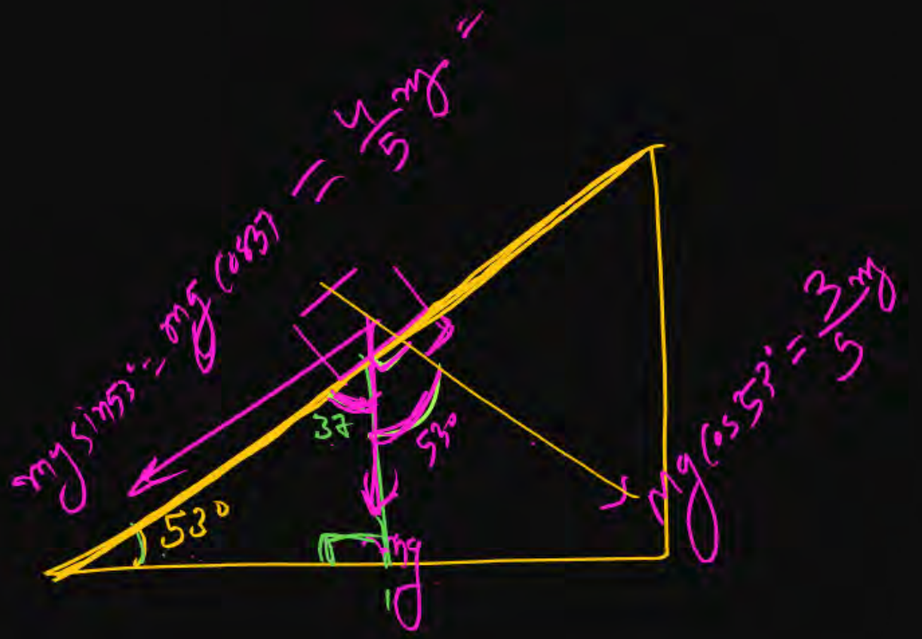


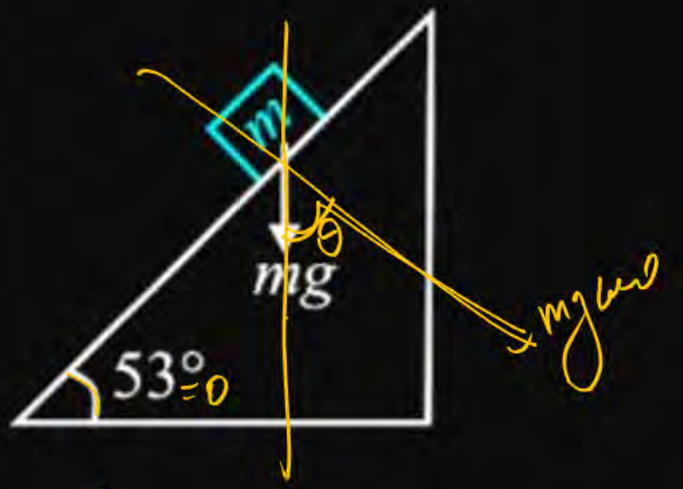
Question-03

$\cos 53^\circ = 3/5$
$\cos 37^\circ = 4/5$

Find component of gravitational force along inclined plane and perpendicular to inclined plane.

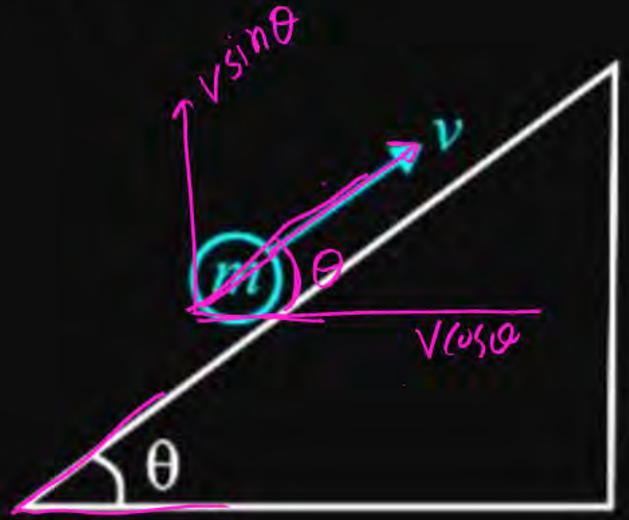






Question-04

Component of velocity along x and y-axis.



$\vec{v} = V\cos\theta\,\hat{i} + V\sin\theta\,\hat{j}$ ✓

Question-05

Find unit vector of given vector:

$\vec{A} = 3\hat{\imath} + 4\hat{\jmath}$

$\vec{B} = -3\hat{\imath} + 4\hat{\jmath} - 5\hat{k}$

$\vec{C} = 2\hat{\imath} + 3\hat{\jmath} - \hat{k}$

$\vec{D} = \hat{\imath} + \hat{\jmath} - 2\hat{k}$

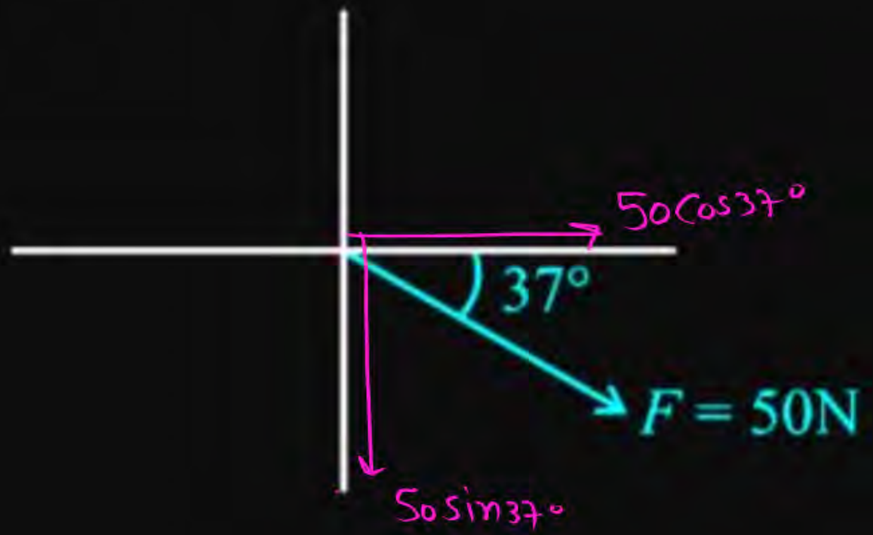
$\hat{A} = \frac{\vec{A}}{|\vec{A}|} = \frac{3i+4j}{\sqrt{3^2+4^2}} = \frac{3i+4j}{\sqrt{25}} = \frac{3i+4j}{5}$

$\hat{C} = \frac{\vec{C}}{|\vec{C}|} = \frac{2i+3j-k}{\sqrt{4+9+1}} = \frac{2i+3j-k}{\sqrt{14}}$

Question-06

Following vector are given:

Then write it in vector form



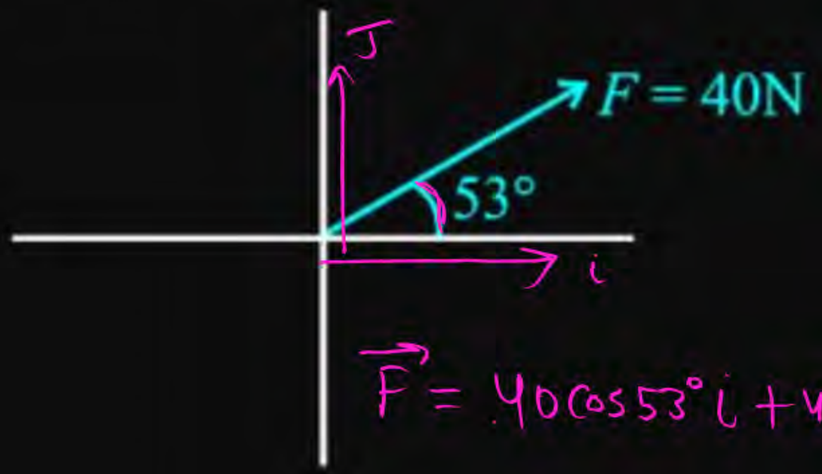
$\vec{F} = 50\times\frac{4}{5}\hat{i} - 50\times\frac{3}{5}\hat{j}$

$\vec{F} = 40\hat{i} - 30\hat{j}$

Question-07

Following vector are given:

Then write it in vector form



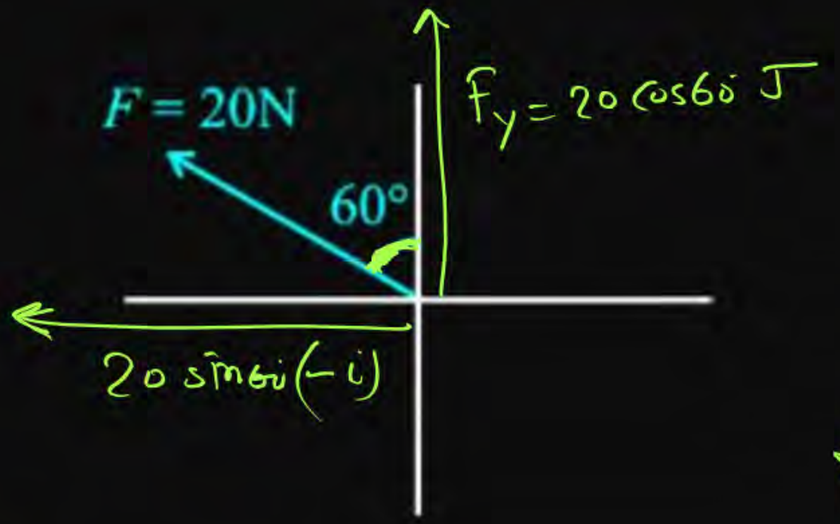
$\vec{F} = 40\cos 53^\circ \hat{i} + 40\sin 53^\circ \hat{j}$

$= 40 \times \frac{3}{5}\hat{i} + 40 \times \frac{4}{5}\hat{j}$

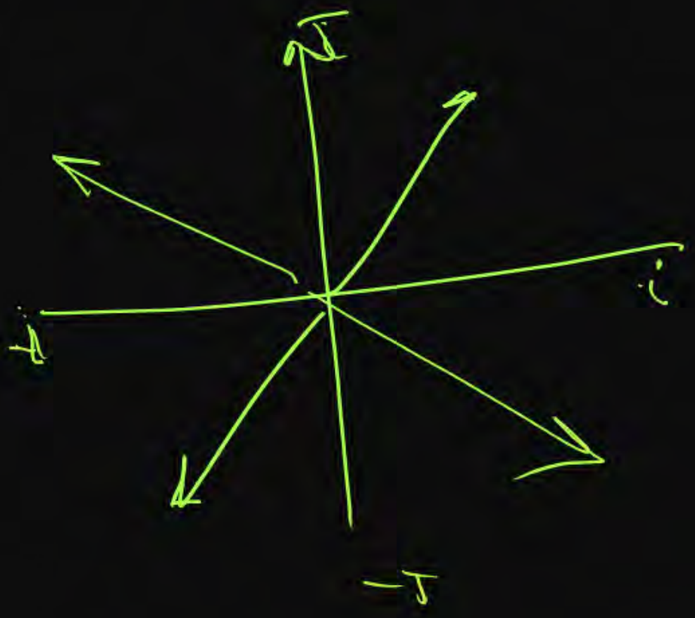
Question-08

Following vector are given:

Then write it in vector form



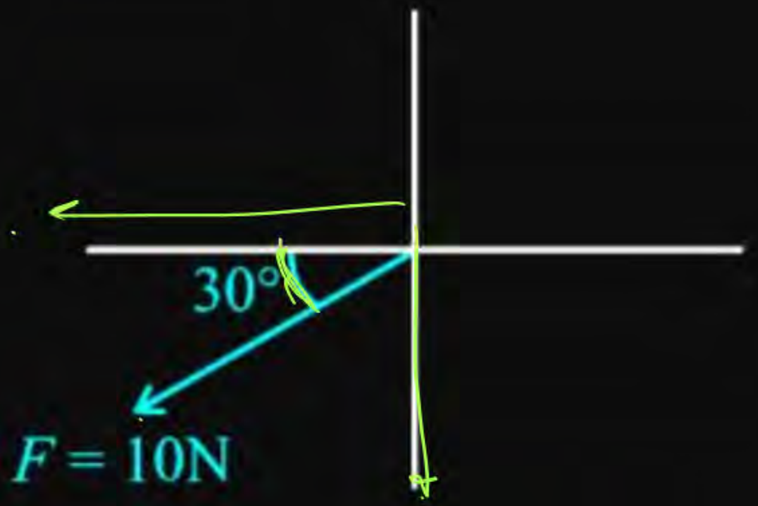
$$\bar{f} = 10\bar{J} - \frac{20\sqrt{3}}{2}\bar{i}$$



Question-09

Following vector are given:

Then write it in vector form

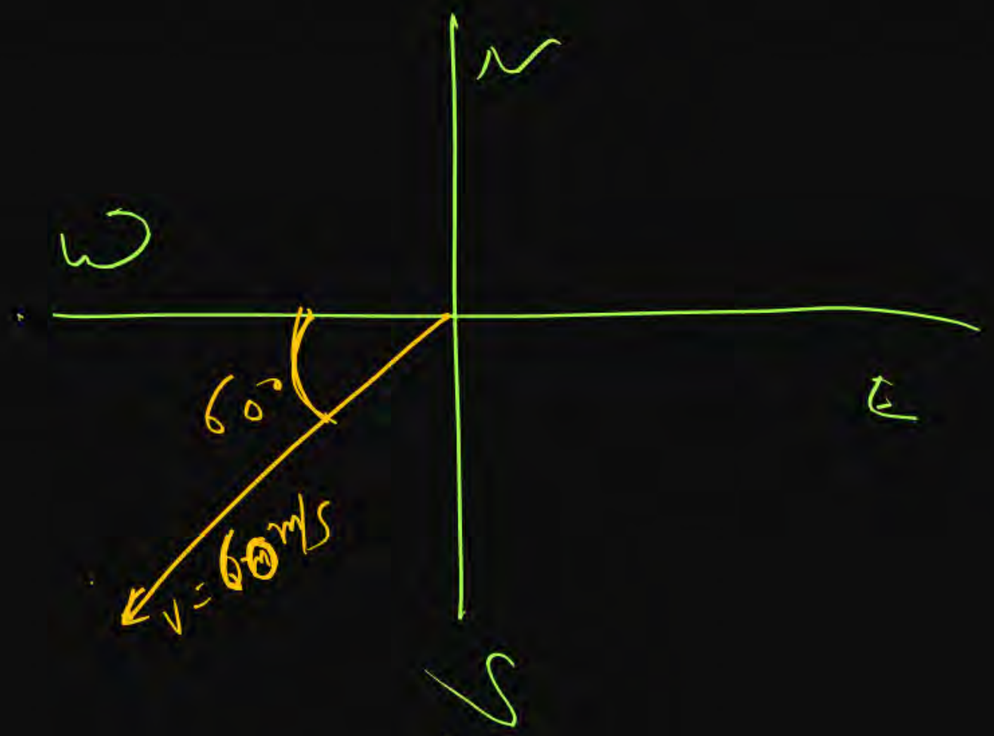


$$\vec{F} = -10\cos 30^\circ \hat{i} - 10\sin 30 \hat{j}$$

Question-10

Draw given vector in graphical representation:

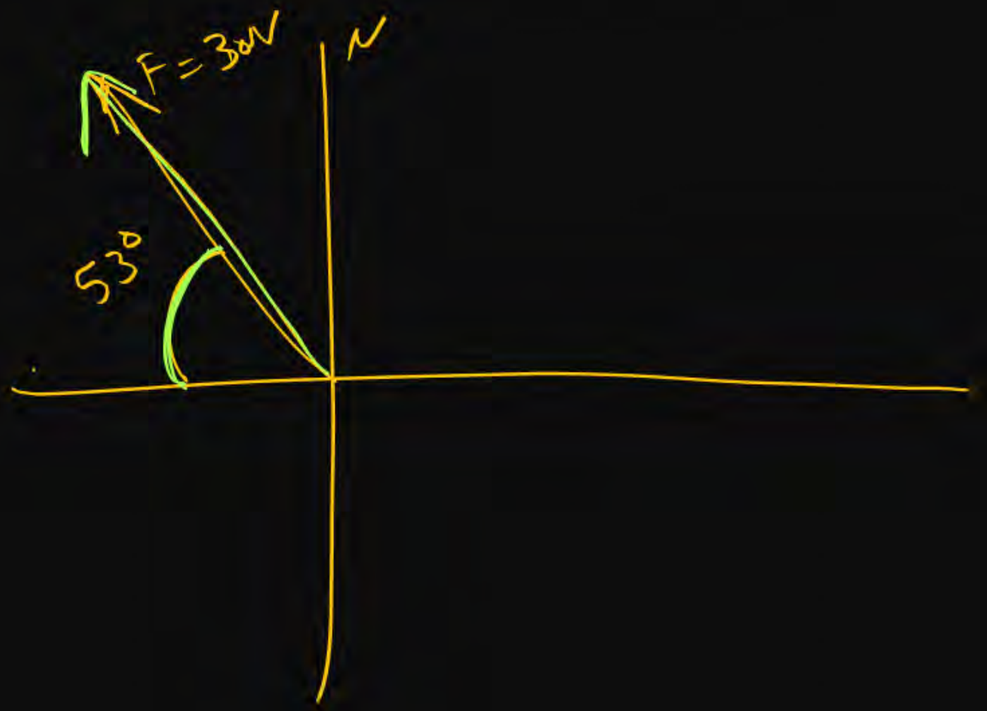
Object is moving with velocity 60 m/s at 60° South of west



Question-11

Draw given vector in graphical representation:

30 N force at 53° North of West



Question-12

Draw given vector in graphical representation:

Force 40 N 53° South of East

Question-13

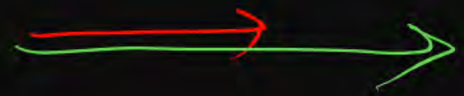
A null vector is defined as a vector having:

1. Zero Direction
2. Zero magnitude and undefined direction
3. Maximum magnitude and fixed direction
4. Zero magnitude and fixed direction

Question-14

Which of the following sets can never represent a system of collinear vectors?

1. 2 N right, 3 N right, 5 N left
2. 2 N up, 4 N up, 6 N down
3. 2 N right, 3 N up, 4 N down
4. 5 N left, 5 N right



Ans → (3)

Question-15

If $\vec{A} + \vec{B} = 0$, what is the value of $|\vec{A}| + |\vec{B}|$?

1. 0
2. $|A + B|$
3. $2|A|$
4. $|A| - |B|$

$\vec{A} + \vec{B} = 0$

$\vec{A} = -\vec{B}$

-ve ve

Ans

Question-16

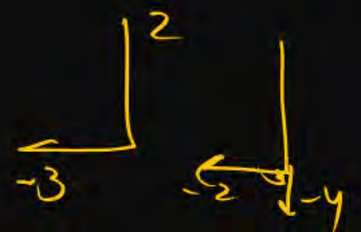
Which of the following sets of components gives a vector of zero magnitude?

1. $(0, 0)$ ✓ Ans

2. $(3, -3)$ (x, y) $= \sqrt{3^2 + (-3)^2} = 3\sqrt{2}$

3. $(1, -1)$ ✗

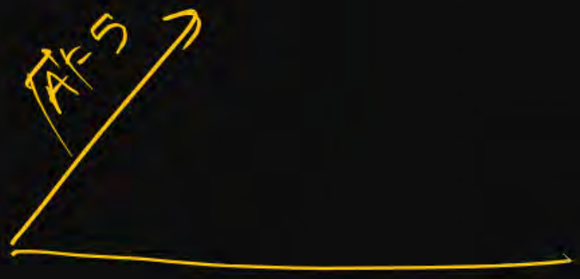
4. $(2, 2)$ ✗

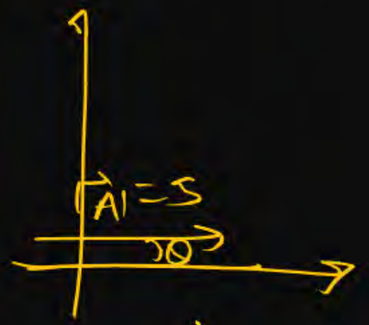


Question-17

A vector $\vec{A}$ has a magnitude of 5. You are told that the x-component of this vector is also 5. What can you conclude about the y-component?

1. It is zero
2. It is positive
3. It is imaginary
4. It is negative





Question-18

A vector $\vec{V}$ has a magnitude of 1 and makes equal angles with x, y and z axes. What is each component?

1. $\frac{1}{\sqrt{3}}$
2. $\frac{1}{3}$
3. 1
4. $\frac{1}{\sqrt{2}}$

$\vec{u} = \frac{1}{\sqrt{3}}i + \frac{1}{\sqrt{3}}j + \frac{1}{\sqrt{3}}k$

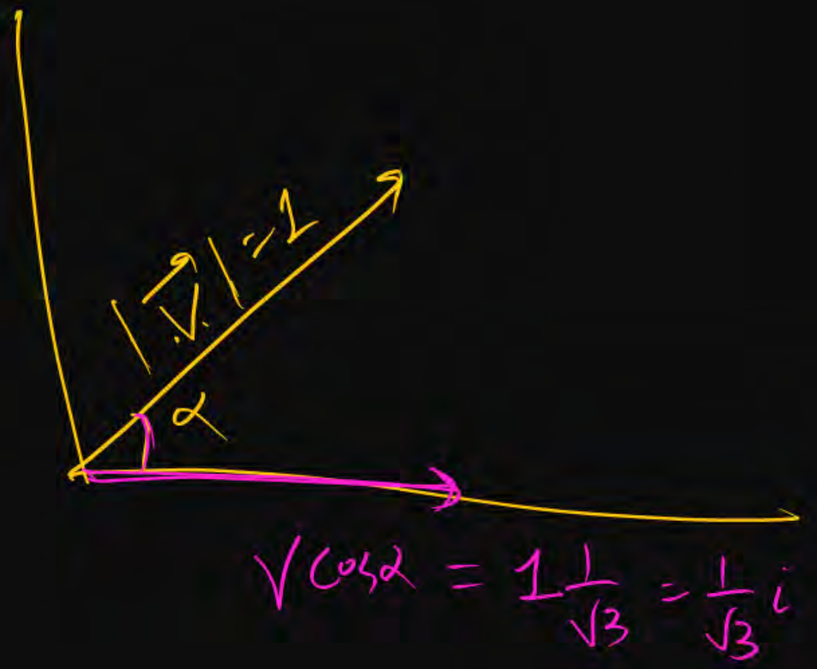
$\alpha = \beta = \gamma$

$\cos^2\alpha + \cos^2\beta + \cos^2\gamma = 1$

$3\cos^2\alpha = 1$

$\cos^2\alpha = \frac{1}{3}$

$\cos\alpha = \frac{1}{\sqrt{3}}$



Question-19

A person walks 1 m east, then 1 m north. What is the unit vector in the direction of net displacement?

1. $\frac{1}{\sqrt{2}}(\hat{i}+\hat{j})$
2. $\frac{1}{2}(\hat{i}+\hat{j})$
3. $(\hat{i}+\hat{j})$
4. $\frac{1}{\sqrt{3}}(\hat{i}+\hat{j})$

$\vec{S} = 1\hat{i} + 1\hat{j}$

$\hat{S} = \frac{\vec{S}}{|\vec{S}|} = \frac{\hat{i}+\hat{j}}{\sqrt{1^2+1^2}} = \frac{\hat{i}+\hat{j}}{\sqrt{2}}$

As

Question-20

Let $\vec{A} = a\hat{i} + b\hat{j}$ be a unit vector. If $a = \frac{3}{5}$, find b.

1. $\frac{4}{5}$
2. $\frac{2}{5}$
3. $\sqrt{\left(\frac{1-9}{25}\right)}$
4. 1

Question-21

Assertion (A): The sum of two unit vectors can never be a unit vector.

Reason (R): The magnitude of the sum of two unit vectors is always greater than 1.

1. Both A and R are true, and R is the correct explanation of A.
2. Both A and R are true, but R is not the correct explanation of A.
3. A is false, but R is true.
4. Both A and R are false.

Question-22

Three equal vectors are placed head to tail forming a triangle. What is the resultant vector?

1. Equal to each vector
2. 0
3. Double of one vector
4. Cannot be determined

Question-23

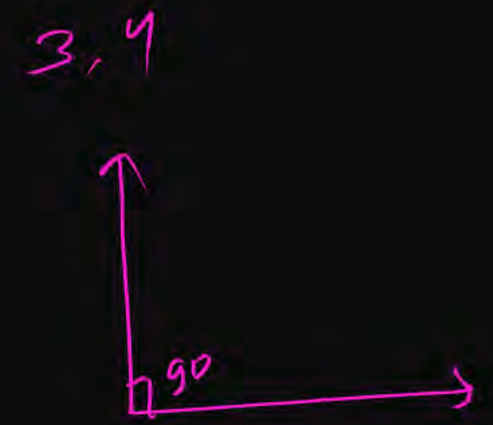
Two vectors are added and the resultant is smaller than both. What must be the angle between them?

1. $< 90°$ ✗
2. $= 90°$ ✗
3. $> 90°$ ✓ Correct
4. $= 0°$ ✗

$$\sqrt{9+16+2\times3\times4\cos120}$$

$$= \sqrt{25-2\times3\times4\times\frac{1}{2}}$$

$$= \sqrt{25-12} = \sqrt{13}$$



Question-24

Vector addition is commutative.

(1) True ✓

(2) False

$\vec{A} + \vec{0} = \vec{0} + \vec{A}$

Question-25

Vector addition violates the triangle inequality.

(1) True

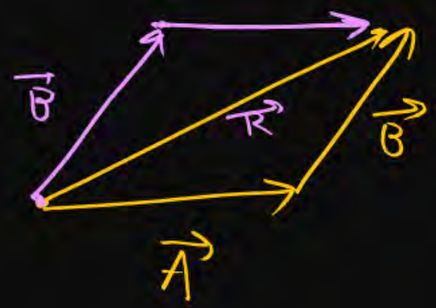
(2) False

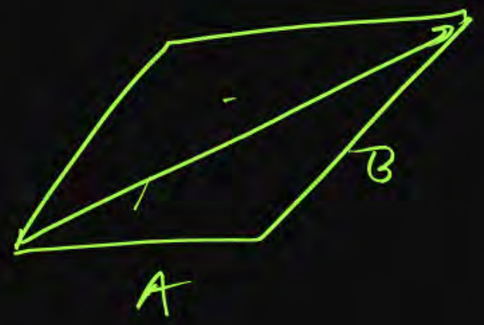
Question-26

Assertion (A): The direction of the vector $\vec{A} + \vec{B}$ lies between the directions of $\vec{A}$ and $\vec{B}$.

Reason (R): Vector addition follows the triangle law or parallelogram law of vectors.

1. Both A and R are true, and R is the correct explanation of A.
2. Both A and R are true, but R is not the correct explanation of A.
3. A is false, but R is true.
4. Both A and R are false.





Question-27

Triangle law of vector addition holds when vectors are:

1. Collinear
2. Coplanar and in same direction
3. Represented as two adjacent sides of a triangle taken in same order
4. Draw from the same origin

Question-28

A particle undergoes two displacements represented by vectors $\vec{A}$ and $\vec{B}$, making an angle θ between them. If resultant displacement is less than both A and B, what can be said about θ?

1. $\theta = 0°$
2. $\theta = 90°$
3. $\theta > 90°$
4. $\theta = 180°$

3 4

$\sqrt{3^2+4^2+2\times3\times4\cos\theta}$

$= \sqrt{9+16+2\times3\times4\left(-\frac{\sqrt{3}}{2}\right)}$

$= \sqrt{25-12\sqrt{3}}$

$= \sqrt{25-12\times1.71}$

$= \sqrt{25-20.52}$

$= \sqrt{4.48}$

Question-29

Two forces of magnitude 8 N and 15 N respectively act at a point. If the resultant forces is 17 N, the angle between the forces has to be

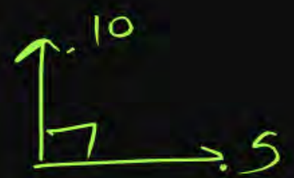
1. 60°
2. 45°
3. 90°
4. 30°

$17^2 = 8^2 + 15^2 + 2 \times 8 \times 15 \cos\theta$

Question-30

Two $\vec{F}_1 = 5$ N due to east and $F_2 = 10$ N due north then resultant of these two force is

1. $5\sqrt{5}$ N
2. 15 N
3. 5 N
4. $\sqrt{5}$ N



$R = \sqrt{25+100}$

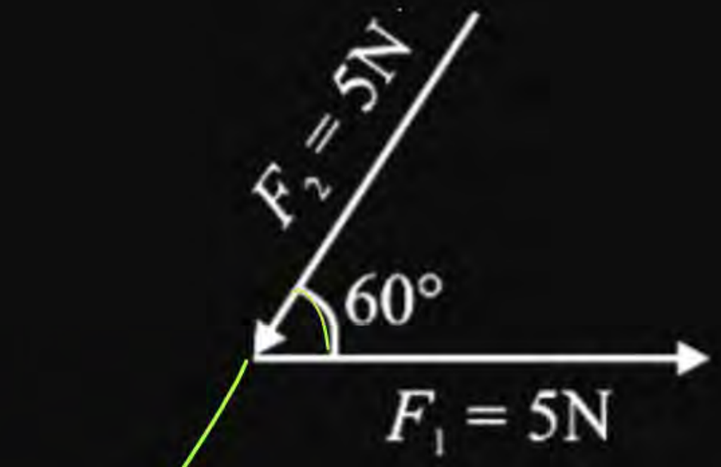
$= \sqrt{125}$

$= \sqrt{25 \times 5}$

$= 5\sqrt{5}$

Question-31

Find net force = $(\vec{F}_1 + \vec{F}_2)$?



$A_y = 5$

5N

120°

5N

Question-32

Two forces of 10 N and 6 N act upon a body. The direction of the forces are unknow. The resultant forces on the body may be

1. 15 N
2. 3 N
3. 17 N
4. 2 N

Question-33

If $\vec{R} = \vec{A} + \vec{B}$ and $R = A + B$ then angle between $\vec{A}$ and $\vec{B}$ must be

1. $90°$
2. $60°$
3. $0°$
4. $180°$

Question-34

If $\vec{R} = \vec{A} + \vec{B}$ and $R^2 \pm A + B$ then angle between $\vec{A}$ and $\vec{B}$ may be

$R^2 = A^2 + B^2$

1. $90°$
2. $60°$
3. $120°$
4. $80°$

Question-35

Two vector of magnitude 2 then resultant of these two vector may be?

1. 2 ✓
2. 8 ✗
3. 5 ✗
4. 6 ✗

$|\vec{A}| = 2$ $|\vec{B}| = 2$

$\vec{R}_{max} = 4$

$\vec{R}_{min} = 0$

$\therefore$ 4 3 2 1 0

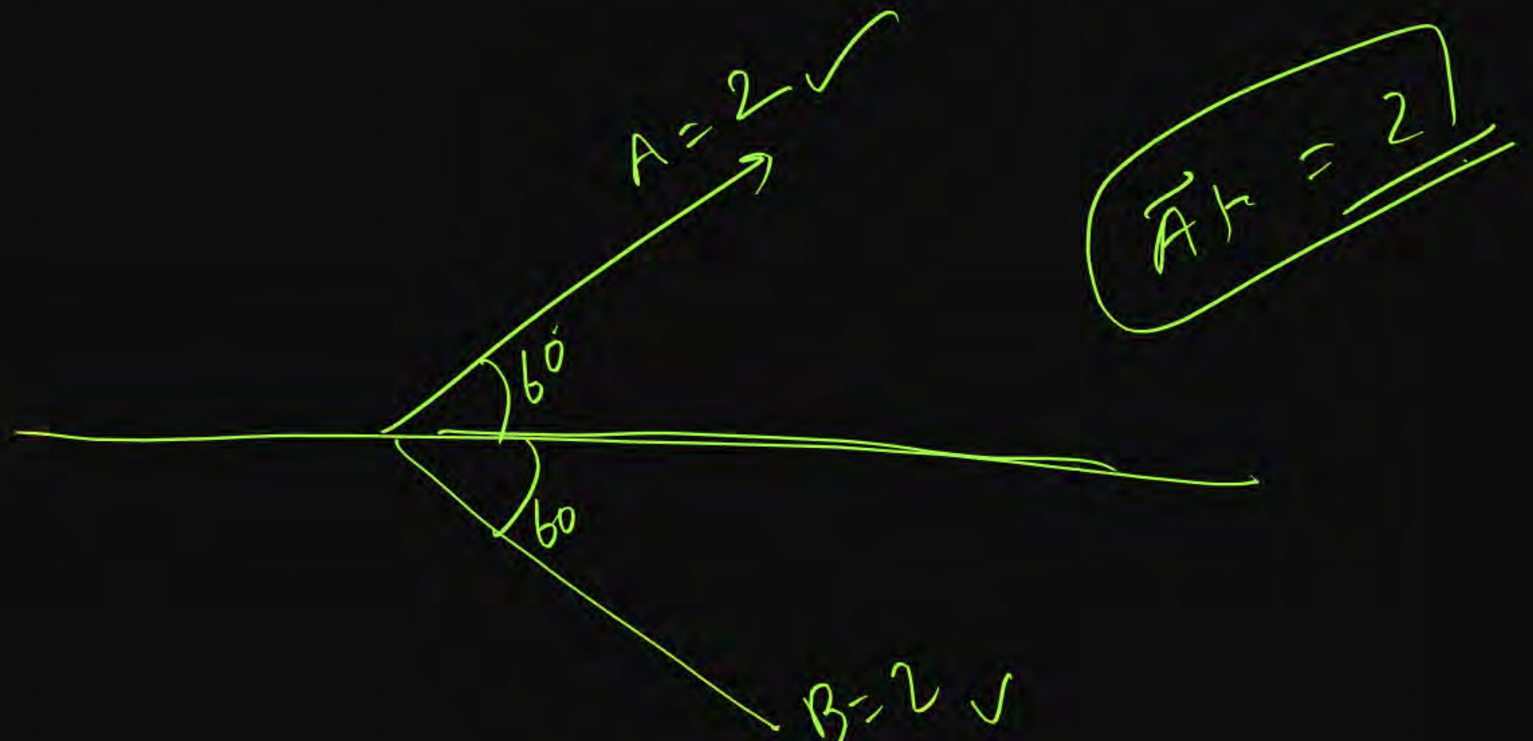
Question-36

Two force 5N and 2N acting on object then net force on object must not be:

1. 2N
2. 1N
3. 6N
4. Both (1) and (2)

Question-37

Vector $\vec{A}$ is 2m long at 60° above the +x-axis and $\vec{B}$ is 2m long at 60° below the +x-axis then resultant will be:



Question-38

If vector sum of two unit vector is a unit vector then:

$\hat{A} = 1$ $\hat{B} = 1$

$\theta = 120°$

Question-39

The ratio of maximum and minimum magnitude of resultant of two vectors $\vec{a}$ and $\vec{b}$ is $3:1$, then $\vec{b}$ in term of $|\vec{a}|$.

$$\frac{a+b}{a-b} = \frac{3}{1}$$

$$a+b = 3a-3b$$

$$4b = 2a$$

$$\frac{a}{b} = 2$$

$$a = 2b$$

Question-40

Find angle between force $2P$ and $\sqrt{2}P$ act so that resultant force is $P\sqrt{10}$.

$$(P\sqrt{10})^2 = (2P)^2 + (\sqrt{2}P)^2 + 2 \times 2P \sqrt{2}P \cos\theta$$

Question-41

Two vector of magnitude 2 and 4 and resultant is $2\sqrt{3}$ find angle between vectors.

$$R^2 = A^2 + B^2 + 2AB\cos\theta$$

$$(2\sqrt{3})^2 = (2)^2 + 4^2 + 2\times 2\times 4\cos\theta$$

$$12 = 4 + 16 + 16\cos\theta$$

$$12 - 20 = 16\cos\theta$$

$$\frac{-8}{16} = \cos\theta$$

$$\cos\theta = -\frac{1}{2}$$

$\theta = 120°$

$\cos 60 = \frac{1}{2}$

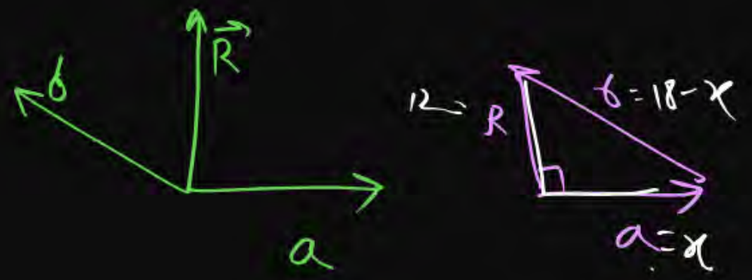
$\cos 120 = -\frac{1}{2}$

Question-42

The sum of the magnitude of two force is 18 and magnitude of their resultant is 12. If resultant is at 90° with the force of smaller magnitude, then what is magnitude of force

$a + b = 18$

$|\vec{a} + \vec{b}| = 12$



$x^2 + (12)^2 = (18 - x)^2$

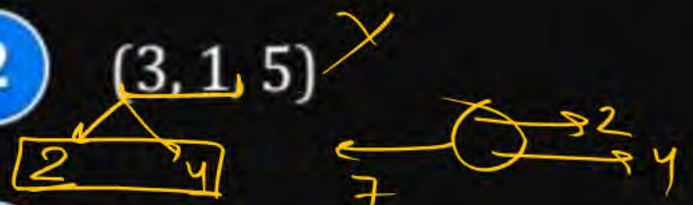
Solve it

Question-43

Which of the combination of three force can give zero resultant.

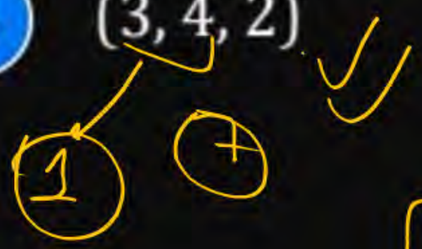
1. (2, 4, 7)

2. (3, 1, 5)



3. (2, 8, 11)

4. (3, 4, 2)



Ans - 4

THANK YOU